The following conclusions may be deduced as to the use of the tourniquet in the collapsed stage of cholera, in exhaustion, &c.:—

1st. By its obstructing the circulation it immediately stops the distressing cramps of the extremities in cholera.

2nd. By increasing the quantity of the circulating fluid in the trunk, and thereby stimulating the heart's action, it removes morbid congestions, stops the secretions from the bowels, increases the animal heat, and powerfully tends to restore health.

3rd. By improving the vigour of the system, medicines act more powerfully, and in a more salutary manner in removing morbid actions.

4th. When the reaction has taken place by loosening the tourniquets with care, the determination of blood to the internal parts is diminished by its diffusion over the extremities, upon which the tourniquet had been placed. They are immediately to be re-tightened when there is any coldness or weakness experienced or any tendency to relapse. This must be most carefully watched for, and prevented.

5th. By increasing the volume of blood in the contracted circulation, the force of the heart is increased, local congestions are removed, and the whole system is strengthened.

Vol. 36.

Art. V.—*On the Mechanical Restoration of the Apparatus of Vision.* By Dr. Debout, Paris, Editor of *The Bulletin Général de Thérapeutique Médicale et Chirurgicale.*

[There is no branch of surgery which has made more remarkable progress since the beginning of this century than that which seeks to remedy the deformities of the human body. Whilst surgeons seek, by bold and ingenious operative proceedings, to extend the limits of autoplasty, instrument-makers in their own department compete with them in their efforts, and do not fear to compare the results obtained by the mechanical with those furnished by organic prothesis. Nothing can be more interesting than to study the real resources which this contest has produced. Dr. Debout has undertaken this task, and has furnished us recently, in the paper, published in our thirty-third volume, on "the Mechanical Remedies for Cleft Palate," with a description of the excellence arrived at by mechanical artists in remedying this deformity. He

still pursues his work with the most laudable zeal, and purposes soon, we understand, to publish a work on Restorative Surgery.

The article which we now publish is a new chapter of his studies; and a portion of it has already appeared in the journal of which Dr. Debout is himself the editor. The author dwells only on the facts that have come under his own observation, and he asks us to produce this second fragment of his work in order to make an appeal to the surgeons of our country. "If," he says, "the French manufacturers have almost a monopoly of the construction of mechanical apparatus, there are also, in other countries, ingenious artists who have contributed effectively to the progress of prothesis; and surgeons who have witnessed their efforts should come forward to give us an account of their results;" and our colleague will gladly avail himself of any observations which will enable him to complete his work.—Ed.]

Of the senses having their seat in the face, there is not one whose deformities require more imperatively the intervention of restorative surgery than the apparatus of vision. The integrity of the accessory parts of these organs is of the utmost importance: thus, the eyelids in no way contribute to the functions of sight, yet their destruction soon entails the loss of the ocular globe.[a] The study of the lesions of this apparatus furnishes us with many examples of the application of prothesis, either devoted exclusively to the improvement of vision, as spectacles, or, to the restoration of a destroyed organ, as in the use of artificial eyes. In fact, there are none of the malformations of the eye—not even those which do not interfere with vision, such as the hypertrophy of the covering of the inner angle, to which the name of epicanthus has been given—which do not demand the intervention of art.

This simple enumeration, incomplete as it is, suffices to show the extent and variety of aid required; but, at present, we shall limit our observations to the lesions which require the aid of mechanical apparatus. It is the artificial eye, with the services it is capable of rendering, that shall be particularly considered in this article.

[a] The ancients were well aware of this fact. Thus, the Carthaginians, in their resentment towards Regulus, believed they could not make him submit to a more horrible punishment than the removal of his eyelids. The history of the Crusades also shows us the cruel spectacle of Christians from whom their conquerors removed their eyelids, and who lost, consequently, not only their sight, but their eyes themselves.

ARTIFICIAL RESTORATION OF THE GLOBE OF THE EYE.

Although shaded by the arch of the eyebrows, and veiled by the eyelids, the eyes shine with so much light, and shed around such brilliancy by their transparency, by the contrast of their colour, and by their mobility, that they predominate over all the other parts of the face. Thus, the loss of one of the eyes creates such a deformity that the necessity for hiding such a mutilation was soon felt. The experiments of this prothesis may be traced back to the most remote antiquity; but, nevertheless, it is only since the beginning of this century that artists who devote themselves to the manufacture of artificial eyes have succeeded in making pieces so perfect that, when they are introduced under the eyelids, the illusion is complete. In the employment of apparatus destined solely to restore the form of the lost organ, mediocrity in the result cannot be tolerated. Here it is all or nothing; for if we cannot succeed in completely hiding the deformity, we aggravate and augment it.

We have elsewhere dwelt on the reality of the resources offered by ocular prothesis in the following terms (*Bulletin de Thérapeutique*, Tom. LXI., page 476):—"In an application of prothesis we are too much disposed to see only the object destined to conceal a deformity; from thence, doubtless, proceeds the small amount of attention which we pay to the real resources of this branch of surgery. It seems, even, as if we feared to compromise our dignity in devoting ourselves to its study; therefore we abandon it completely to those unfortunate mutilated ones who are obliged to have recourse to it."

How few are the surgeons who, in witnessing a purulent melting of the eye in a subject still young, can offer to him, as a source of consolation, the benefit of ocular prothesis; these hopes, nevertheless, would be all the better received if the patient belonged to those interesting classes of society in which each individual must provide for the wants of his existence by the exercise of a profession. Now, in our state of civilization, individuals who present any deformity offensive to the eye are debarred from many employments, even the humblest. How many persons would object, solely because she had lost an eye, to take into their service a servant? Look at that young soldier: a brilliant action has entitled him to be promoted with honour; but he has lost an eye in the fight—without the benefit of prothesis how could he pursue a career so well begun?

We ourselves, are we not each day, in our practice, exposed to a like danger? When opening a bubo may not a drop of pus be projected into one of our eyes, and there develop that formidable purulent ophthalmia which so rapidly destroys all eyes which it affects? May not a sharp instrument, during the course of an operation, escape from the hands, and strike us in the eye? We are all acquainted with hospital surgeons who, from these causes, have lost an eye; but, thanks to the resources of prothesis, their patients, and even the greater number of the pupils who, each day, follow their visits, are ignorant of the accident. How many of our readers, who have paid a visit to our regretted predecessor, have perceived that he also wore an artificial eye? To these too real motives for sympathy, which alone should cause us not to contemn the study of ocular prothesis, are joined others not less plausible, but which touch us more directly, inasmuch as they bring us back to our daily course—that of treating disease. As soon as the globe of the eye is atrophied the eyelids are deprived of their support; they can no longer move themselves, therefore remain almost always closed. The lachrymal and Meibomian glands, not being altered, continue to secrete, so that the liquids, which they unceasingly furnish, collect in the orbital cavity, and produce inflammation. This soon causes inversion of the eyelids, of which the lashes sweep the ocular stump, often producing obstinate headache. The best means of treating these accidents, both general and local, is by resorting to prothesis. As soon as an artificial shell is introduced between the eyelids these membranous veils recover their freedom of motion; the circulation is restored to its normal state, and reacts on the secreting surface of the conjunctiva, and also on the ocular stump. One of the greatest benefits of prothesis (of which we shall furnish, further on, a remarkable example) is in a case where, notwithstanding the destruction of the cornea, the sight is not completely lost—when the patient can distinguish light from darkness, and where the brilliancy of a strong light, making an impression on the retina, reacts on the sight of the healthy organ. An artificial shell applied to the diseased eye in this case serves as a screen, and prevents further inconvenience to the healthy eye. The same phenomenon is observed in certain cases of monocular cataract, and causes great annoyance in the use of the healthy eye, from whence arises deplorable errors in the practice of ophthalmology.

But, in order to produce these good effects, it was necessary that

the industry of the artist should at length have succeeded in giving us enamel shells as perfect as those in use at present. Yet, for many centuries, the unceasing attempts of art have only borne witness to the strength of that instinct which induces man to hide his deformities.

The history of artificial eyes brings us back to an epoch long anterior to the Christian era. In proof of this we have the painted pieces which are seen placed between the eyelids of a great number of Egyptian mummies. In our museums of antiquities are also to be seen some statues with silver, and others with gold enamelled eyes. In spite of its antiquity, the art of making artificial eyes has made but slow progress, since we still find that in the sixteenth century prothesis was only applied to maintaining, in front of the closed eyelids, a metallic plate on which was painted an eye surrounded by its membranous veils. These plates were fastened on by a string which surrounded the head. This description of eye seems to have disappeared very slowly, as one of our contemporary authors, Rognetta, mentions having seen an invalid who still wore one of these eyes (*ecblepharos*). "I admit," adds he, "that I prefer a hundred times a simple black bandage to such a clumsy placard." The figure represented in the work of Ambrose Paré appears to offer us an example of this (*ecblepharos*).

One sees, in the same chapter of this author, the representation of a plate made of enamelled gold, of the colour of the natural eye, intended to be placed under the eyelids (*hypoblepharos*); but whatever might be the skill of the painter, his pencil could not depict the fulness or curve of the cornea. Add to this that these plates must be immovable, on account of their having no connexion with the subjacent ocular stump, and we may rest assured that these eyes were in themselves deformities.

If one reflects, besides, on the representation which is given us of these pieces, we may well be doubtful of their utility. The acuteness of the internal angle of the artificial eye cannot fail to wound the caruncula lachrymalis, and the similar disposition of the external angle must interfere with the maintenance of the piece in the orbital cavity, and allow it to slip from between the eyelids.

Later on they attempted to give these metallic plates the form of a shell, better adapted to the configuration of the cavity destined to receive it; but all these experiments, however ingenious they may have been, failed to produce any practical result. The gold plate, prepared to receive the layer of enamel, always gave these artificial

eyes a considerable weight, so that these pieces soon caused inflammation of the tissues on which they rested.

At length, the first trial in making enamel eyes took place; but, for a long time these were only used for ornamenting the heads of dolls and marionnettes—afterwards, for animals intended for natural history collections.

The development of the manufacture of artificial eyes at last produced pure enamel shells, extremely light, and to which were given the exact form of the human eye—that is to say, they had a projecting cornea. This was a real and considerable progress which should enable prothesis henceforth to answer to the requirements of practice, the rest being necessarily the result of experience—the work of time.

And now, the makers of artificial eyes have succeeded in imitating the transparent cornea, the anterior chamber, the radiating form of the iris, the pupil, the selerotic, and the vessels of the conjunctiva, with such a degree of perfection that it is often difficult, not to say impossible, to distinguish the fictitious eye from the natural one.

If we add, that with these improvements, the clever artists who devote themselves to this speciality, contrive, by ingenious sections at the edges of the shells, to adapt them to all the irregularities of the surface of the lost eye, so as to take advantage of the mobility of the stump in order to establish complete harmony between both eyes, we can imagine to what a degree of perfection the art may attain.

I have frequently witnessed the following occurrence:—When a patient, wearing an artificial eye, presents himself at the clinique of M. Sichell, this clever ophthalmologist requests one of the pupils who attends his class to make a diagnosis of the affection from which he suffers. After an attentive and minute examination of the eyes, the young student reports an immobility of the pupil of one eye, and, sometimes, a more or less increased density of the globe—never have I seen the existence of a prothetic piece recognized—and great, invariably, has been his surprise on being told that the eye, on the disease of which he had been discoursing, was an enamel one.

The various figures which we publish explain, by the numerous and diversified forms of the edges of the shells (see Fig. 6, 7, 8, and 9), how the application of an artificial eye no longer requires a previous operation; and the use of enamels, which resist for a greater length of time the dissolving action of the humours of the

orbital cavity, each day lessens the great misfortune of losing an eye.

Thus, in the treatise of Hazard Mirault, published in 1818, we see that this artist recommended the artificial piece to be changed, every six months at least, whilst M. Boissonneau, in the paper which he read at the Ophthalmological Congress of Brussels, mentions a period of double that duration:—"The polish of the artificial shell lasts," he says, "for more than a year; and at the end of that time they have merely lost their brilliancy, without ever becoming uneven on the surface."

THE ADAPTATION OF ARTIFICIAL EYES.

Success in the adaptation of an artifical eye depends on the exactitude of the relations which are established between the artificial piece and the oculo-palpebral cavity which is to contain it; and the anatomical conditions vary with the cause which has produced the loss of the organ, thus :—

1st. The disease may have destroyed the function without altering, so to speak, the form of the organ; the ocular globe may be merely a little atrophied, as at the end of purulent and variolous ophthalmias, &c.

2nd. A staphyloma of the transparent cornea, or of the sclerotic, may have developed itself at the end of the ophthalmia.

3rd. Wounds, in destroying the ocular globe, may have injured the eyelids and produced adhesions, by cicatricial bands, between these organs. When any loss of the substance of one of the eyelids exists the complication is still more grave.

4th. As a consequence of the extirpation of the eye, two conditions may present themselves—either the organic lesion may have been still intraocular, and the surgeon has been able to put in practice the proceeding of Bonnet, and enucleate the globe—or else the disease may have extended beyond the limits of the eye and invaded the surrounding tissues, rendering it necessary to remove all the contents of the orbit.

In the first of these cases the preserved muscles impress on the stump movements sufficiently extensive to enable the patient to wear an artificial eye with advantage. It is not so in the latter case, when, the muscles having been removed, the aid of prothesis must limit itself, even under the most favourable circumstances, to the employment of an artificial piece, which will generally remain motionless.

LOSS OF THE EYE IN CONSEQUENCE OF OPHTHALMIA.

These cases are the most frequent, and are those in which prothesis furnishes the best results; we ought, therefore, to give them especial attention, and so much the more, as our classical authors, even the most authentic, are full of errors on this point.

Thus, Boyer, in the first few lines of his treatise, which he devotes to artificial eyes, says:—"The globe of the eye must be diminished at least one-third in order to have an enamel piece adapted to it." Most subsequent authors have repeated this instruction; from thence proceed those operations which aim at reducing the volume of the eyes before bringing the patients to artists who apply the artificial pieces.

Prothesis does not require these preliminary operations; on the contrary, the less the globe of the eye is diminished in volume the less the eyelids droop, and the more the region of the eye preserves its normal projection; therefore, in these cases, the face is scarcely deformed, even prior to the application of the artificial eye.

The support which the piece receives from the voluminous stump allows of its being made equal in size to the healthy eye; the eyelids cover it easily, and arrange themselves in regular folds, and the harmony of the aspect is complete. It is, therefore, most important to preserve, as much as possible, the volume of the lost eye (as far as the nature of the disease or the operation renders it practicable)

The prothetic piece finds on the voluminous globe of the eye, a part of its support, which it derives, on the contrary, entirely from the conjunctiva, when the globe is much atrophied; the pressure which the eyelids exercise on the artificial piece is then supported by a greater extent of surface; and, therefore, there is less cause for fatigue. So that we seldom see in these favourable cases those granulations supervene which too often appear in the cavity when the globe is much atrophied, and always when the patients neglect to renew their shell in good time; these morbid productions diminish the extent of the oculo-palpebral cavity, and injure the appearance of the restoration as well as the mobility of the piece.

Those patients who have the ocular stump large and voluminous will always be able to wear their shell for a greater length of time in good condition than those who possess little or no stump. We know many persons—amongst others, two of our medical brethren—who, abusing the advantages they derive from having a voluminous globe, have worn the same shell for many years—one of them not being even taken out for more than a year.

In one of the patients of M. Boissonneau, junior—a most negligent man (his fortune forbidding all idea of economy), who had worn for two years and a half a shell already a little worn—this oculist remarked that the granulations, although very small, had almost the consistency of horn. When this accident happens the upper eyelid no longer folds so well, and falls more than the healthy one.

Thus we see, when the globe of the eye remains large, not only is it more easily used, but it remains a much longer time in these conditions than when the eye has been atrophied; which, however, does not prevent persons who take the necessary precautions (and they are very simple) from wearing for an indefinite time, in very good condition, a shell which has no other support than the sinus of the conjunctiva. We are convinced of this from observing it in a great number of old people—amongst others a M. F., a patient of M. Boissonneau, whose left eye was diminished at least three-fourths. The cavity did not show the slightest trace of vegetation, although he assured us that he had worn artificial eyes from the age of nineteen, and he is eighty-three at present. From the appearance of the shells we would have thought it desirable to have had them somewhat smaller.

The artificial eye receiving at the same time its movements from the stump, and from the conjunctival sinus displaced by the globe of the eye, we can understand that the more voluminous the globe the more extended will be the motions which it will impress on the artificial shell in this respect.

The advantage which the volume of the stump presents is not less evident. The only inconvenience of these large globes (if it is one, which we do not think) is to necessitate the use of artificial shells perfectly fitted. It is indispensable that the stump of the eye should not be compressed by the enamel shell; and this ought to be constructed so as to preserve a regular position in the very extended movements which the bulb conveys to it. Thus we see the difficulties are confined to the artists; and as the patients derive benefit from this, we need not hesitate with respect to these voluminous stumps, whatever some specialists may say on the subject.

It cannot be too often repeated, that a piece, well adapted, produces the most beautiful results; but in order that the patient may profit by it we must not too long delay its introduction. In this way may be prevented the sinking of the eyelids—the movements of which exercise so great an influence on the expression of

the face. M. Boissonneau, junior, in his notice on "Artificial Eyes," has given drawings of the principal modifications which the oculo-palpebral region undergoes after atrophy of the eye destroyed by ophthalmia. We have borrowed these illustrations from him; they are most interesting, and serve to prove the advantages of an early use of artificial pieces.

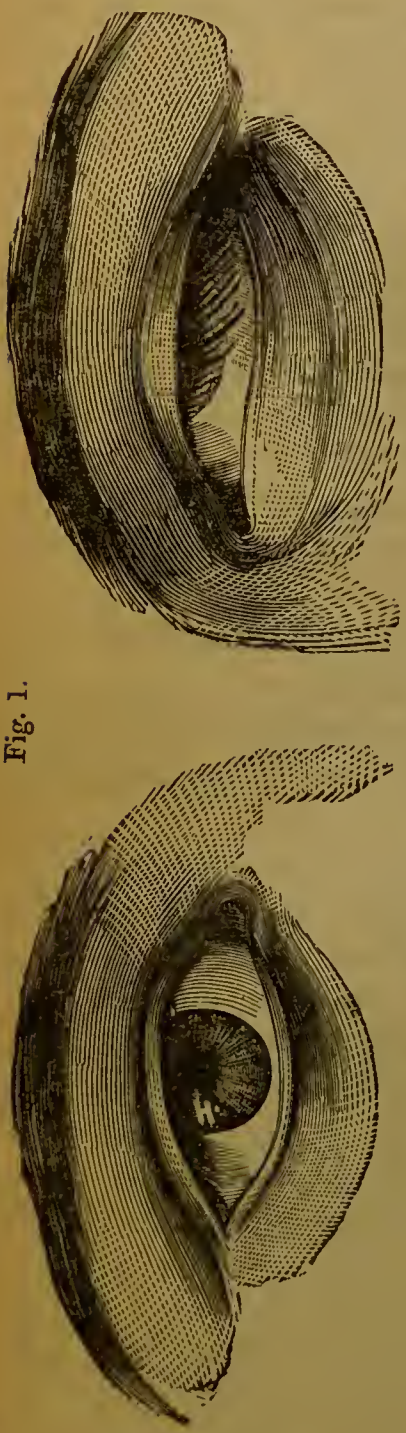


Fig. 1.

The first figure represents both eyes of a woman thirty years of age; the left eye, which has been lost, is in the most favourable condition for the adaptation of an artificial eye. The globe of the eye is diminished about a fifth of its natural size; it has preserved its spheroidal form; the transparent cornea is completely disorganized; and one perceives in the place which it occupied a cicatrix, generally of a greyish colour, which is more or less extended according to circumstances. This case may be the result of the ablation of a staphyloma —part of the cornea and the iris only being taken away. In this case the artificial piece finds a solid support on the stump of the eye, as well as a most useful source of motion. All cause of sensibility is destroyed, and the deformity of the face is no longer to be feared.

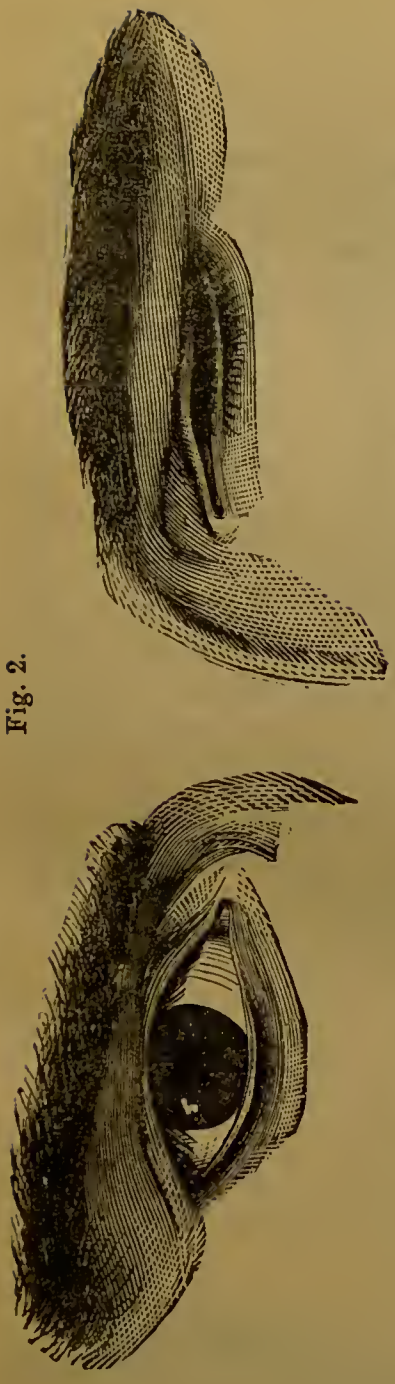


Fig. 2.

The second figure gives the exact representation of the region of the eye in a subject twenty years of age, who lost the left eye in his infancy, at the age of six months, after purulent ophthalmia. The atrophy of the globe was complete; the eyelids, after being depressed, had contracted, for want of the support of the globe ; they remained immovable, and their development was arrested. The bones which constitute the orbital cavity have gradually approached each other; the frontal is considerably lowered ; whilst the malar is on a higher level than at the side of the healthy eye. The healthy eye has also shared the deformity, as the obliquity of the inner side of the eyebrow indicates.

If, in a case like this, we examine the features of the patient, we will perceive that the whole side of the atrophied eye is shrunken and wasted, whilst the side of the healthy eye presents the rounded curves of a normal development. In this case ocular prothesis can but imperfectly remedy the deformity. The artificial eye will be smaller than the healthy one, and its mobility scarcely perceptible.

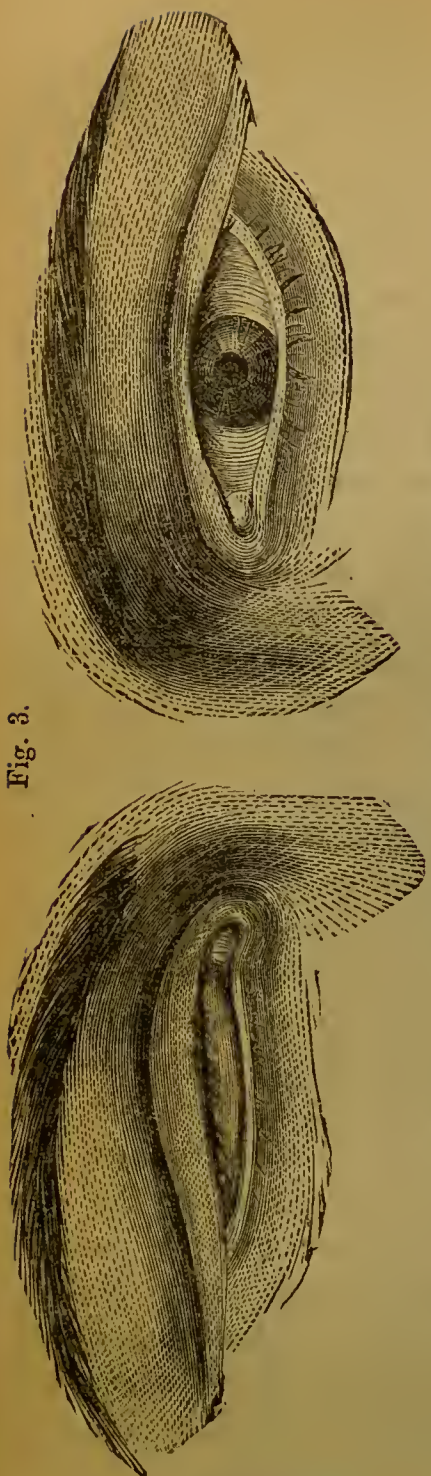
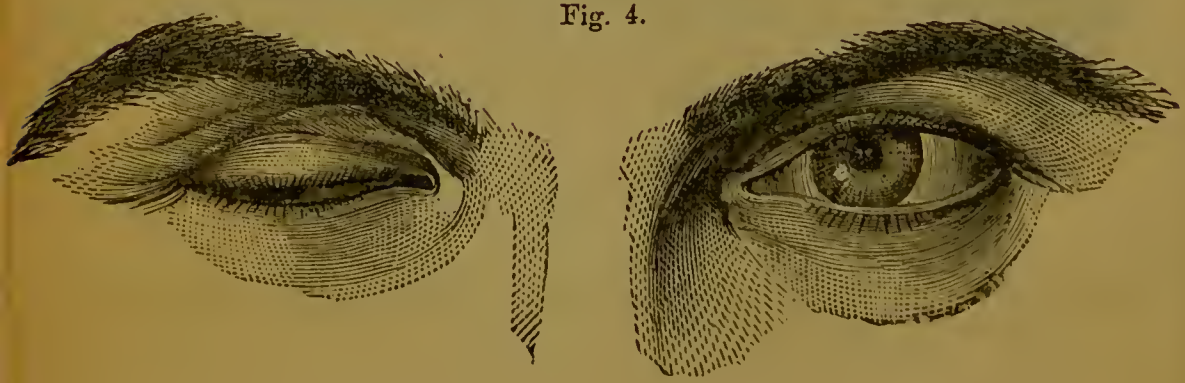


Fig. 3.

The third figure represents the eyes of a young girl of 18. The left eye is healthy, and of large dimensions; the right eye is lost. The globe, which was affected by a staphyloma, underwent an ablation of its anterior quarter. The work of cicatrization was complete about a month after the operation, and the globe preserves but a third, or about the half, of its normal size. Its anterior part presents a smooth surface, the eyelids are sunk down on the ocular stump, but the short time which has elapsed since the operation has not permitted of the tissues contracting.

The size of the artificial eye may equal that of the healthy one, but its movements will not be as extended as in the case represented by Fig. 1.

Fig. 4.



The fourth figure represents the eyes of a man of 40 years of age. The left eye is healthy; the right eye, which is lost, has undergone no operation. It became atrophied after the disease with which he was affected. It is reduced to half its size, and has preserved a spheroidal form, so that its anterior part is rounded. The diminution of the globe commenced some months back; therefore the eyelids are sunk on the stump, and their tissues are already contracted. The palpebral opening has lost about a fifth of its extent.

The use of the artificial eye may dilate the eyelids, and enable them to regain all the amplitude which they have lost.

In this case the size of the artificial eye will be but very little smaller than the healthy one, and its mobility satisfactory.

THE ARTIFICIAL EYE CONSIDERED AS A SCREEN.

It often happens, in cases of external ophthalmia, that the whole cornea is not completely disorganized, but that it still admits some luminous rays to penetrate the interior of the eye. The retina not being affected, the patient receives an imperfect impression of light; and clinical observation has shown that this imperfect sensorial impression reacts injuriously on the vision of the other eye. The aberration of vision at last increases to such an extent that the patient has to seek medical advice. The morbid phenomena are generally unknown; and treatment is useless, if not dangerous. We allude to that intemperate surgery which does not hesitate to extirpate the affected eye; just as if it should prescribe the removal of a finger because of a thorn in it, in order that the disease may be cured in a more certain manner.

The most simple and efficacious method of preventing these affections, and of removing them when they exist, is the use of the artificial eye. The enamelled shell then acts as a screen, which prevents the entrance of light, and at the same time conceals the deformity.

Prothesis in such cases is a work of considerable delicacy. The tolerance of the artificial shell depends upon the degree of the disorganization of the cornea. This part is, in fact, the seat of the extreme sensibility of the organ to contact with foreign bodies. When the cornea is not completely disorganized the application of an artificial eye is only possible when the posterior aspect of the shell is hollowed out in such a manner as not to touch the portion of cornea which still remains sensitive. A clever artist may always

succeed in overcoming this difficulty, which is sometimes considerable, as we should bear in mind.

After the shell has been worn for some time, the patient does not hesitate to say to you:—"I know not to what, to attribute the improvement in my sight; but, unquestionably, I see better since I have worn my artificial eye."

The following is an example:—

Loss of the Right Eye; Partial Atrophy of the Globe; Staphyloma of Iris and Cornea; the Sensorial Impressions of this Organ Disturbing the Function of the Healthy Eye; Adaptation of an Artificial Eye; Rapid Improvement in the Sight.

Maria G., aged 19, admitted in May, 1862, into the Clinical Hospital, for a staphyloma of the iris and cornea. The loss of the eye was of two months' standing, the cause being a violent internal ophthalmia. Although the sight was completely destroyed, and the patient could not distinguish any object, she still received a qualitative impression, and could discern at which side of the apartment the light entered. This slight sensorial impression was sufficient to affect the vision of the healthy eye. The patient, however, had no knowledge of it, as she had not as yet returned to her work. She had presented herself at the hospital to have the tumour removed, which, she had been told, was indispensable before an artificial eye could be adapted. M. Nélaton, not having undertaken anything of this kind, sent for M. Boissonneau, junior, to ascertain from him if an artificial shell could be introduced without resecting the staphyloma of the cornea; and upon his giving an affirmative answer, the young girl was sent to him.

The work of prothesis was very delicate. The globe of the eye was partially atrophied; and, further, the cornea was completely disorganized, forming a staphyloma, on the surface of which were three points, not so solidly cicatrized as the rest, through which the iris protruded. Moreover, the palpebral aperture was on a lower horizontal plane than that of the healthy eye, which always occurs whenever, during an attack of ophthalmia, the eye acquires a development which exceeds its normal size. Such was the condition of the oculo-palpebral region when M. Boissonneau was called upon to adapt an artificial eye. To suit these organic peculiarities this artist had to construct a shell which should only exercise upon the staphyloma, as upon the rest of the eyeball, a

pressure equally light and regular. This he accomplished by making an excavation, corresponding to the staphyloma, destined to receive the protrusion of the cornea, so as to avoid all cause of inflammation of the globe of the eye. The effort was crowned with complete success. The patient wore the shell without any inconvenience; and after the lapse of a few days, when she was quite accustomed to it, she assured us that she was quite at ease with her artificial eye. What struck her most, and which she could not understand, was the improvement which was produced in the healthy eye. The pupils could not explain the phenomenon any better, the majority of them being present at the adaptation of an artificial eye for the first time.

The only desideratum wanting in this operation was the raising of the palpebral opening which was a little too low. This was not the fault of the artist, and time alone could remedy the difference in level between the two palpebral openings. The stretching of the eyelids, by a greatly enlarged eyeball, is analogous to the stretching of the abdominal muscles in ascites; it is necessary for a certain time to elapse before the tissues can again resume their former tonicity.

When the patient left the hospital, two months after her admission, the staphyloma seemed to have diminished; the hernia of the iris no longer protruded, and the cornea at these points was more firmly cicatrized.

In the case under the care of M. Nélaton the use of the artificial eye may be considered as a preventive of the aberrations of vision, the loss of the eye being of two months' standing. But as I have before stated the aberrations may become more intense, and the nature of the morbid phenomena may escape the sagacity of the medical attendant, and the remedies, consequently, be useless.

The following case is that of a lady who was confined to her apartment for eight years, and who, five days after the application of an artificial eye, recovered her former sight:—

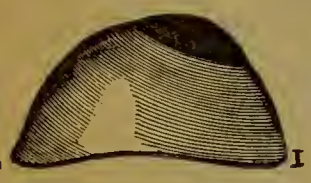
Incomplete Disorganization of the Cornea; Functional Aberration of Vision in the Healthy Eye, causing the Sequestration of the Patient for Eight Years; Application of an Artificial Eye; Rapid Cure.

Madame X., the mother of one of our medical celebrities, lost her right eye, after an attack of ophthalmia, in 1848. Although vision was completely destroyed, yet sufficient sensorial impressions

persisted to react on the healthy eye, so that it was so sensitive to the action of wind, cold, and damp that, notwithstanding the use of very dark blue spectacles, she suffered to such a degree that she had to confine herself to her room. All the means employed were of no avail, and she believed herself the victim of an incurable disease. At last, after a seclusion of eight years in almost complete darkness, she determined to come to Paris for advice. Her father sent her to M. Desmarres, who, not finding any inflammation of the disorganized eyeball, advised her to try the effect of an artificial eye, and sent her to M. Boissonneau, junior.

The eye was only diminished about a fifth part of its natural size; the cornea, not being completely destroyed, was very sensitive, so that the prothetic shell had to be constructed so as to avoid all contact with this part. After several trials this clever artist at last made a shell[a] (Fig. 5) which the patient could wear, and which she could at first wear for an hour, afterwards for two. At last, on the fifth day, she wore the shell for the whole day. Under the influence of this screen the unpleasant symptoms ceased immediately, and the health and spirits returned to their former condition.

Fig. 5.



This lady has worn her artificial eye for seven years, and has returned to her former habits. She can walk out in all weathers, and go into society, and neither the inclemency of the weather nor the glare of the lights have any injurious effect upon her.

Had the eye been extirpated the result could not have been more complete; but then the artificial eye could not have been so well adapted.

While considering the subject of prothesis we do not wish to enter into the question of extirpation of the disorganized eyeball in cases in which the lesion of this eye reacts on the function of the healthy eye. A question of such importance, and of so serious a nature should not be discussed in an incidental manner; we shall, however, again return to its consideration. Notwithstanding the title of this paper we shall venture to give the history of a case in which this practice failed, and which will, at the same time, be an example of the rare condition in which ocular prothesis is inapplicable.

[a] In this and the following figures the letters E and I mark the points coresponding to the external and internal angles of the eye. This piece is represented so as to show the depth it was necessary to give it so as to avoid all contact between the cornea and the shell.

Neuralgia Complicated with an Ocular Concretion; Extirpation of the Eye; Impossibility of the Application of Prothesis.

Madame X., a wealthy Spaniard, 50 years of age, suffered, from time to time, for several years, from neuralgia in the right oculo-palpebral region. In the year 1860, when travelling in Germany, her eye was attacked with an acute inflammation. Being near Berlin, she hastened to place herself under the care of Professor Graëfe. This talented oculist discovered that the complications were caused by a calcareous concretion—he proposed to the sufferer to have the eye extirpated. The operation was performed according to Bonnet's method (of Lyons); the eyeball was enucleated so as to preserve the muscles. The patient recovered rapidly; and the cavity which remained beneath the eyelids was quite suitable for the adaptation of an artificial eye The lady hastened to Paris, in order to secure more fully the advantages of prothesis. On her arrival, two months after the operation, Madam X. was sent to M. Boissonneau by Dr. Dunglas, who attended her during her residence in Paris. The oculo-palpebral cavity was, as we have said, in the best condition in which it could be after such an operation; there was no inflammation, cicatrization was complete, and the small stump formed by the re-united muscles preserved sufficient power of motion to communicate some to the artificial eye. In a word, every circumstance seemed favourable for as complete a result as could be expected after the eyeball had been cleverly and successfully extirpated. The patient, medical attendant, and oculist had no doubt of success, but they were all disappointed. The first eyes tried by M. Boissonneau were worn without inconvenience; their volume was gradually increased, but not equal to that of the healthy eye. These trials were received with gratitude, for the artificial eye, by everting the eyelids, prevented the ciliæ from irritating the conjunctiva; but this success was not of long duration, and the lady was obliged to forego the benefits of prothesis, notwithstanding that the smaller shells did not exert any pressure on the stump, nor any twitching of the eyelids, the inconvenience increased; the mucous membrane became irritable; and the neuralgia returned. Numerous modes of special treatment were employed without advantage, and for two years this lady could not bear the artificial eye for more than one hour at a time, and even then not every day.

This failure of prothesis is, I must say, an exception; nevertheless, I thought it well to report it, to show the caution with which we should proceed when we have to remove an eyeball.

THE DISPOSITION OF THE SHELL WHEN THE EYELIDS ARE ADHERENT TO THE OCULAR STUMP.

Of all the lesions complicating the loss of an eye there are none which render the work of prothesis more troublesome than the presence of bands and adhesions between the eyelids and the globe of the eye. In fact, when the adhesions are numerous, the artificial shell has little or no capability of motion, because the stump, which is the chief agent in moving the shell, is itself fixed by these cicatrices. The difficulty is still greater if the eyeball is much atrophied, for the eyelids are then drawn backwards, and the artificial shell cannot push them forward so as to restore their normal prominence.

It is well known that surgeons obstinately continue to endeavour to destroy these obstacles so as to facilitate the adaptation of the artificial eyes; but their efforts, in this respect, only serve to render the task of the oculist more difficult, if not impossible. We do not hesitate to insist on the unfortunate results following from even those operative proceedings which have been most praised, for this serious error is far from being corrected by the numerous failures. Of this we can give recent proof—for only yesterday we were consulted by a poor girl, who had been waiting with impatience for six months to have her deformity redressed, so that she might return to her situation. She continued in this deplorable condition —as the oculist into whose hands she had the misfortune to fall wished to apply one of those methods which he was in the habit of obstinately employing. I sent her to M. Boissonneau, junior, and in a fortnight she will return to her situation; and it was high time, for her means of support are exhausted.

It is, therefore, necessary to impress upon surgeons the truth—that all their endeavours to destroy a symblepharon are useless,[a] particularly when the palpebro-ocular adhesion extends to the bottom of the conjunctival sinus. When it is desirable to employ a prothetic shell, the simplest method is to leave to the ingenuity of the artist employed to make the eye, the formation of indentations in the border of the enamelled shell corresponding to the cicatricial bands. These lesions, though inconvenient, and rendering the adaptation of the shell more difficult, are not insurmountable, for they are generally limited to the lower eyelid. The following cases are proofs of what has just been stated:—

[a] Except Mr. Teale's operation, which is most effectual.—TRANSLATOR.

Atrophy of the Eye, complicated with Adhesion to the Stump, extending superiorly to the bottom of the Sinus.

M. X., a notary, aged 29, was wounded when out shooting. A grain of shot penetrated the left eye, having passed through the upper eyelid, near the internal angle. The eyeball was disorganized and atrophied to about half its natural size. At the point where the shot penetrated, an adhesion formed between the eyelid and the globe. The wound had involved the bottom of the conjunctival sinus.

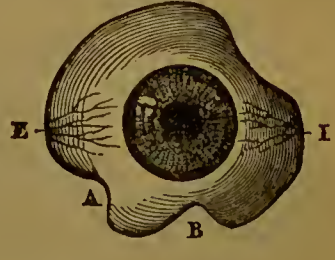
The inflammation continuing for a considerable time after the wound was healed—that is to say, after the atrophy of the globe of the eye—M. X. was unable to avail himself of the advantages of prothesis for four months after the accident. During this time the eyelids lay in contact with the ocular stump; their tissues were retracted, so that they became shortened in their extent.

Two indications had to be fulfilled by the artificial shell—firstly, to fit them upon the band without exerting more pressure upon it than on the rest of the conjunctival sinus; secondly, to restore the eyelids to their primitive width, and preserve this. The indentation at (A Fig. 6) is to receive the adhesion, whilst the depression at (E) rides upon the fold which the conjunctiva frequently forms after atrophy of the globe. The object of this arrangement is to maintain the separation of the angles of the eyelids as in the healthy eye, which the traction maintained by the cicatricial band on the opposite angles had a tendency to destroy.

This shell is movable, does not give any inconvenience, and M. X. has used the same model for eight years.

Fig. 6.

Fig. 7.



Disorganization of the Eye; a Double Cicatricial Band of the Inferior Eyelid; a Double Indentation in the Border of the Shell.

M. de X.; his gun burst in his hand when out shooting. A portion of the barrel wounded the right eye in two places, which implicated the lower eyelid and the eyeball; the latter was

disorganized. The two wounds of the eyelid gave rise to two cicatricial bands which involved the whole depth of the conjunctival sinus; onewas situated near to the external commissure, the other at the external third of the lid. Professor Nélaton, under whose care the patient was, left these adhesions untouched, knowing that M. Boissonneau could triumph over them.

Fig. 7 represents the shell which this artist made for the case. The two indentations A and B, on the inferior border externally, correspond to the two bands, on which they rested without irritating them. The eyeball, being rather more than half its normal size, communicated a considerable degree of motion to the shell.

M. X. has worn this model for two years and a-half.

Cicatrices following burns are more tense than those after other injuries. A simple indentation is not then sufficient; it is necessary that the edge of the shell which corresponds to the palpebral adhesions should be disposed so that it may rest upon the adhesion without exciting inflammation.

Eye Disorganized by a Burn; Synblepharon Uniting the Inferior Eyelid to the Eyeball throughout its External Half.

M. de X., aged 30, professor of chemistry in an Italian university, was one day in his laboratory, engaged in making an experiment, when the matrass, which he was about to put upon the fire, exploded. Some drops of the acid were splashed into his left eye; and, notwithstanding the means he at once applied to neutralize the effects, the cornea was destroyed, the vision lost, and, finally, the lower lid united partially to the eyeball. Professor Marcacci, of Pisa, was called upon to attend the case; and when he was cured sent him to M. Boissonneau.

Fig. 8.

Fig. 8 represents the artificial eye which this artist constructed to conceal the deformity of this wound. Its general conformation is that of a shell constructed to fit a voluminous ocular stump, except that the lower edge is very much sloped off so as to suit itself to the synblepharon. Thanks to this arrangement the shell fits as well as if no complication existed. The artificial eye is equal in size to the healthy one, and its movements almost as well performed.

These bands may be caused by the improper use of artificial eyes. We shall here give some examples, for we cannot be too careful in

warning patients of the unpleasant consequences which sometimes follow the use of shells intended to conceal their deformity.

When the artificial eye is well made, and properly fitted, and is used with that prudence which common sense suggests, it gives no inconvenience, and may be said not to be in the least injurious. But, on the contrary, if the manufacture is left to fancy, and it is badly fitted, particularly if the shell is large, and if it is worn after the enamel is destroyed, and the surface roughened, and the inferior edge sharpened, or if it is not removed during the night, malformation of the oculo-palpebral cavity may always be expected to follow. It is generally the inferior sinus that first becomes affected. The mucous membrane swells, which increases the pressure on the affected part, and excoriation takes place. To this first effect on the palpebral conjunctiva the action of the roughened surface is added, and by this combination vegetations sprout up; these take the form of granulations which are often pedunculated; the patient then consults his medical attendant, who excises the vegetation, cicatrices follow, reducing the cavity, and the shell has to be diminished in size. When these accidents frequently recur the cicatrization extends to the bottom of the palpebral sinus, which fills up by degrees, and the eyelid at last becomes united to the eyeball throughout its whole extent, as in the case of a burn.

Synblepharon caused by the use of Deteriorated Artificial Eyes of too Large a Size.

Madame X., aged 30, by an inexcusable carelessness, and in spite of frequent warnings of the injurious effects resulting from wearing artificial shells for too long a time, allowed a synblepharon to form, so that at the end of 10 years she was obliged to forego the advantages of prothesis, and had to return to the bandage.

This woman kept one of the most frequented shops in the Chaussée d'Antin, and she was in despair at this misfortune. One of her customers came to me in the hope that I could recommend some artist to her who could repair her deformity. I examined the patient, and found that a portion of the centre of the sinus still existed which had not been filled up by cicatrization. I thought that M. Boissonneau, junior, could take advantage of this small cavity for the adaptation of an artificial eye.

Fig. 9.

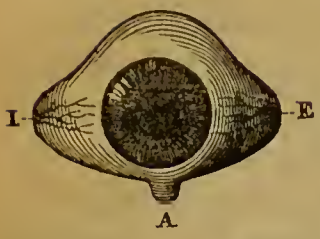


Fig. 9 exhibits the form and size of the shell constructed by this artist. The little appendix at the lower part, A, introduced into the only remaining portions of the inferior sinus, served to fix this part of the shell. The superior oculo-palpebral sinus had also lost much of its depth, indicated by the narrowness of the superior sclerotic segment of this shell. Enlightened by an experience so dearly bought, this woman removed her artificial shell from time to time, and for more than eight years she always used the same model.

At times, especially when the eyeball is much atrophied, very irregular-shaped tumours are formed, produced by the causes mentioned above. In such cases the construction of the artificial shell is a work of great delicacy, and requires a very clever artist.

Considerable Atrophy of the Eye ; a Tumour produced in the Oculo-palpebral Sinus by wearing the Artificial Eyes for too Long a Time.

Madame X., piano teacher, lost her right eye from an acute ophthalmia, when she was five years of age. Four years after the accident artificial eyes were employed; but, from the carelessness of her parents, the shells were rarely renewed, so that at the age of 19 she had to give up using them. In consequence of the irritation produced by the inferior edge of the shell, which was too large, and from which the enamel was worn off, a large cicatricial tumefied band formed, which was not firm enough to support the shell. The artificial eye was ejected from the oculo-palpebral cavity whenever she made any sudden movement. The patient had generally to wear a bandage to hide her deformity.

Madame X. had come to that period of life when the regularity of her features was all important to her. She intended to teach music, and depended entirely on her own talents for support. She could not prosecute her career unless she could abandon her bandage. She tried in vain the shells made by various oculists, until she discovered M. Boissonneau, junior, who, more fortunate than his *confreres*, made her a model which she uses to this day—when she is twenty-nine years old. *Fortunate* is not a term to apply to the efforts of M. Boissonneau; for this artist does not hesitate to devote six months to ensure success, and to construct more than thirty shells, of various shapes, before obtaining one that could be worn by the patient without inconvenience or fatigue.

The drawing which we give (Fig. 10) represents this shell, in profile, showing its external edge.

Fig. 10.

In shape this is very different from that of the artificial eyes of which we have been speaking. The following are the anatomico-pathological peculiarities which required this arrangement:—

We have already stated that this lady lost her eye in extreme youth, and that she did not commence the use of artificial eyes for several years after the accident. The partial atrophy of the disorganized globe and the absence of the prothetic shell for four years, gave rise to a remarkable arrest of development in the orbital cavity. We may add, that there were numerous cicatricial bands, nearly all more or less tumefied, which had been produced by the prolonged use of the first shells; and this explains the remarkable contraction which the oculo-palpebral cavity presented. The chief obstacle to the work of prothesis was a thick band which occupied the whole inferior conjunctival sinus, and extended from one angle of the eye to the other. M. Boissonneau had, in the first place, to dilate the cavity, so as to render it capable of receiving a shell, which should correspond in size to the healthy eye. Then to form a point of solid support, without exciting irritation. He attained his object by forming an artificial sinus behind the swelling, which, as we have said, occupied the whole inferior sinus. The shell was made so as to rest and to hook itself at the same time in the new sinus, with the assistance of the superior border of the shell, which was curved backwards and downwards. The cicatricial band lies between the prolongation (O) and the inferior edge of the shell, which only rests on the back of the free ciliary border. As the adaptation is perfect, no one could suspect, even on a close examination, that the shell does not rest as usual in the conjunctival sinus.

The shell is so firmly fixed that the lady can make any movements without fear of its falling out, and is able to wear it the whole day. In fine, with regard to appearance and motion, the effect is so satisfactory to this lady that she has been able to resume her teaching, and to go into society without her deformity being suspected by anyone She married very suitably some years ago.

It was in 1852 that M. Boissonneau invented this model for Madame X. She has worn the same kind ever since. Under their use there has been no fresh unpleasantness, and the cavity is so much improved that M. Boissonneau is now engaged preparing one for her of a less complicated form.

APPLICATION OF AN ARTIFICIAL EYE AFTER EXTIRPATION OF THE EYEBALL.

The lesions which necessitate the extirpation of the eyeball may be limited to the internal structures of the organ, or may have engaged the surrounding tissues.

In the first case, enucleation of the eyeball is all that is necessary; whereas, in the second, the surgeon has to sacrifice a considerable amount of the neighbouring parts.

The condition of the orbit varies considerably after such operations, and the deformity is always considerably greater than when the eyeball is simply atrophied.

Where it is possible to remove the eyeball according to M. Bonnet's[a] method, the muscles and the greater portion of the conjunctiva being preserved diminishes the size of the cicatrices, and the rapidity with which the wound heals renders the cicatricial structure less liable to contract; moreover, the stump is movable, and can communicate its motion to the artificial shell. It is very different when all the structures contained in the orbit have been removed. The eyelids are drawn backwards by the cicatrices, so much so that in some cases the eyelids are found to be on a plane a centimètre posterior to those of the healthy eye. They are also frequently drawn into folds by the cicatricial bands, which diminish their extent.

The variations in the orbital cavity are not less various; the granulations frequently contract when cicatrized, to such an extent that it is impossible to apply an artificial eye; or, if possible, the shell should be so small that it could be of no advantage to the sufferer.

The indications to be provided for by the prothetic shell increase in proportion to the defective condition of the orbit after extirpation. In fact, the artificial shell should only push the lids forwards, so as to diminish their retraction. The eyelids do not recover their colour and shape unless particular attention is given to the convexity of the enamel shell. It must also be so constructed that it may fit a very irregular cavity without giving uneasiness. It should also reëstablish the conjunctival sinus, so as to avoid lachrymation. Finally, it should dilate the cavity so that the artificial eye may be made as nearly as possible equal in size to the healthy one.

The motions of the artificial eye, which are generally limited and often none, have lastly to be attended to.

[a] Of Lyons.

Many surgeons, fearing the results which might arise from a foreign body, such as an artificial eye, being placed in an orbit from which the eye had been removed for a disease having a tendency to return, hesitate to employ an artificial eye, notwithstanding the great desire expressed by the sufferers to conceal the deformity which resulted from the operation to which they had submitted. The results furnished in the following four cases show how little foundation these fears have in fact:—

Melanotic Tumour; Enucleation of the Eyeball; Artificial Eye worn for Thirteen Years.

M. A., when 34 years of age had his left eye extirpated by Professor Velpeau, in the year 1847; this operation was required for a melanotic degeneration of the internal structures of the eyeball, and limited to them. The method of operation adopted was that of Bonnet, of Lyons. The muscles and conjunctiva being preserved, formed, when healed, a small stump, which communicated tolerably decided movements to the artificial shell. The cavity was rather

Fig. 11.

Fig. 12.

larger than usual. When healed, M. A. was sent to M. Boissonneau, junior, to make an artificial eye for him. For thirteen years he has always employed the same model, and, as it has been always carefully fitted, his prothetic shell has never caused him the least inconvenience.

Tumour of the Maxilla developed in the Cavity of the Orbit; Extirpation of the Tumour and Enucleation of the Eyeball; Artificial Eye worn for Eighteen Years.

M., four years old, was admitted into *La Charitè* to have a tumour removed, which sprang from the maxillary border, and grew into the cavity of the orbit. Vision being destroyed, Professor Velpeau removed the globe of the eye along with the morbid growth. When the wound was healed, M. Velpeau advised the parents to bring the child to M. Boissonneau, junior, so as to prevent an arrest of development by the intervention of prothesis, as the orbital cavity was sufficiently large to receive an artificial shell. As the tumour

engaged the lower portion of the orbit, the operator had to remove a very large portion of the conjunctiva, so that the inferior sinus in which the shell should rest was rather deep. Notwithstanding this circumstance, M. Boissonneau, junior, was able to construct an eye of average size; when this was achieved the child was conducted to M. Velpeau.

Since that time, M.—who is now a man—has worn an artificial eye; and, although his parents frequently neglected to replace his shell when worn out, he has never suffered any inconvenience, with the exception of a slight irritation, which the substitution of a new shell was sufficient to remove completely.

Cancer of the Eye; Extirpation of the Eyeball; Absence of the Sinus of the Conjunctiva; Peculiar Position of the Prothetic Piece.

M. S., the son of a German physician, when 24 years of age had his eye extirpated on account of a cancerous degeneration of the globe. As the young man was a student of medicine at Bonn, he was operated on by the Professor of Surgery at that University. It appears that in this case the method by enucleation could not have been put in practice, as the cavity resulting was of a very irregular form. The upper eyelid only was free; the lower was adherent throughout its entire extent to the fibrous structures which filled the cavity of the orbit. This circumstance prevented the eyelids from closing, which exposed the cavity of the orbit, permitting the red tissues which lined it to be seen.

M. S. recovered rapidly; but a shocking deformity remained, which he endeavoured to conceal with a bandage. M. S., being a young man, he not only wished, but it was necessary for him to follow his pursuits; he also wished to compete for a position which, at a later period, he obtained. For these reasons he determined to try what prothesis could do for him.

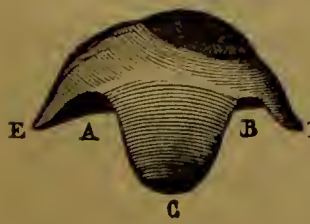
Unhappily he was wrongly informed, and visited all the principal cities of Germany in search of an artist which did not exist. He found many collections of artificial eyes, ready made, from which he sought to adapt one to his own case; but in such a case success was impossible; for, on account of the absence of the inferior sinus, none of the shells could be retained in position. One oculist tried to detach the lower lid from its attachments by repeated operations, but with effect of rendering the condition of the parts worse and worse. The number of cicatrices was augmented, and the attempts

to unite the eyelids only aggravated the deformity. Although much discouraged, M. S. decided, in February, 1855, to go to Paris; before doing so he consulted M. Sichel, who saw no hope but in prothesis, and sent him to M. Boissonneau.

M. S. went, accompanied by his father, to this oculist, who found the following conditions:—The cavity was of average dimensions; but the sides were lined by numerous cicatricial bands. The inferior eyelid was adherent throughout its entire extent. Two firm bands—one occupying each angle—formed two well-marked protrusions. The upper eyelid was free, but the cicatrices to which it was attached prevented its being completely lowered. The red surface of the cavity was quite exposed.

From the first trial, M. Boissonneau saw that he would have to contend with innumerable obstacles. In fact, the shell, having no support, fell at the slightest motion. As soon as he succeeded in fixing it firmly, the contractions of the orbicularis threw it out. When the upper eyelid contracted, the shell was drawn inwards and turned so that its concave surface was turned outwards. This difficulty was the most troublesome to overcome. M. Sichel, who was present at these trials, suggested to M. Boissonneau to place a pledget of lint in the cavity of the orbit—this device almost succeeded. But the lint had the effect of exciting some irritation, and increasing the secretion of the membrane, whereas the enamel has not this inconvenience; on the contrary, when substituted for the lint, the membrane loses its redness, the secretion diminishes, and rapidly disappears. He then tried to afford to this patient the advantages which he had before observed when he had employed the enamel alone. At last, after a month had been spent in experiments, M. Boissonneau constructed the model which is represented in Fig. 13. In this drawing the inferior edge of the shell is shown.

Fig. 13.



This shell answered every purpose that could have been desired in such a case. M. S. could make every motion without fear of seeing his eye falling out. The artificial eye could be moved from side to side, but not up and down. When looking straight forward the two eyes are quite parallel. The shell restored the palpebral opening to its normal form and size.

The patient wore this shell from the time he rose in the morning until he went to rest at night, without the slightest inconvenience.

The structures did not present the least signs of irritation. The secretion and flow of tears returned to their normal condition without being mixed with muco-pus.

Seven years have now passed since these results were obtained. His father states that there has been no change since his visit to Paris. He had not even the trouble of calling on M. Boissonneau; when he required a new shell he had only to write for it.

Melanotic Cancer; Extirpation of the Eye and Muscles; Unusual Position of the Enamel Shell.

Abbé P., 50 years of age, was sent, in 1856, to M. Boissonneau, by M. Deprès, *Chirurgien-en-Chef* to the Hospital of Bicêtre, who had extirpated the right eye. The extent of the disease had compelled the surgeon to remove the eyeball, the muscles as well as the fatty cellular tissue of the orbit. Contrary to the usual course, the cavity retained its full dimensions and did not fill up with fibrous growths, as is usual after extirpation of the eyeball. A soft bed of cicatricial tissue covered the bone. The abbé was a very distinguished literary man, and a diligent student; his health was being very much enfeebled by his labours and had lost all its vigour. After a time the eyelids sank into the cavity. The deformity was so great that, notwithstanding the simplicity of his manners, this ecclesiastic desired to have it remedied.

When M. Boissonneau saw the patient, the cavity presented the following appearances:—It presented in its antero-posterior diameter the form of a cone, of which the base was in front. It was necessary to have recourse to means other than those usually resorted to. The form of the shells generally in use—more or less hemispherical and concave—was insufficient. It was lost in the depth of the cavity. It was necessary to find a point of contact much further back than usual. M. Boissonneau constructed a shell, cylindro-conical from before backwards. The summit of the cone, supported on the bottom of the cavity, measured almost half a centimètre in circumference; but prudence required that the point of support should not be limited to the bottom of the cavity, but that the pressure should be distributed over as large a surface as possible, so as to afford the eyelids sufficient support to keep them in position, without, however, giving rise to any irritation of the tissues which lined the orbit.

Fig. 14.

For this purpose, and also to give the anterior portion of the shell the form of the healthy eye, the two parts corresponding to the two angles (E and I) were elongated, so as to be supported by each of these angles. Moreover, all the inferior surface of the shell was hollowed out, so as to press lightly on the posterior surface of the lower eyelid. Thus, the points of contact were as much disseminated as possible.

The shell being light, maintained a parallel position with regard to the other eye without causing fatigue. The natural conformation of the Abbé P.'s eyes being deeply set, rendered the absence of motion less remarkable. Thus, the deformity was completely concealed.

This venerable ecclesiastic did not long enjoy the advantages of prothesis, for six months after the operation he died, as is frequently the case, from a secondary melanosis of the liver. But a fortnight before his death he wore his shell, which, notwithstanding its length and unusual form, never excited the least irritation in the orbital cavity.

We believe that we may insist on the value of these observations; for Mackenzie, in his excellent treatise on Ophthalmology, says:— "After the extirpation of the eye, it is rarely that an artificial eye can be made use of." Yes, that is often true; especially when one endeavours to employ a ready-made eye. It also often happens that a clever artist often succeeds in surmounting the obstacles by knowing how to construct the shells to suit the deformity of the palpebral cavity. We have chosen those forms constructed by M. Boissonneau, which differ most from those in general use, in order to show to what a degree of perfection ocular prothesis has arrived. These results will henceforth prevent surgeons making experimental operations, such as those of Dieffenbach, who, after extirpation of the eye, thought he could fill up a part of the orbit with a portion of the skin taken from the temple.

In this case, as in those in which cicatricial bands exist—we do not fear to repeat—the work of restoration must be entirely given up to the cleverness of the artists who make the artificial eyes.

We have, moreover, chosen our examples from cases in which the shells have been worn for many years, so as to prove to surgeons the harmlessness of the intervention of prothesis in these cases. Our dear master, M. Velpeau, in communicating, amongst other facts of his practice those which we have given above, told us that he did not believe there was a single surgeon in France who would

hesitate to employ an artificial shell in these cases. This precept is not yet so general as he thought, for we read in a note to the last translation of the work of Mackenzie:—"Is it prudent to wear an artificial eye after the eye has been extirpated on account of scirrhus, fungus, and melanosis? Without proscribing absolutely in such cases the use of the artificial shell, we say that it should be removed before the least irritation is excited. Patients who have escaped such formidable affections should be content to live with closed eyelids.

Clinical experience shows that, in such cases, there is no danger connected with the use of the artificial eye. The restoration is not less complete, when the artificial shells do not wound the patient, than it is when the organ has been destroyed by a traumatic injury.

Prothesis is difficult ; but as its use is harmless, the practitioner should not doubt the benefit of artificial shells in these cases.

ON OCULAR PROTHESIS IN CASES OF DIVISION OF THE EYELIDS, OR COLOBOMA.

Wounds of the eyelids, when they have been deep enough to attack and destroy the globe of the eye, often leave behind them a division of these membranous veils. The edges of the wound, badly closed, heal separately, and there remains between them a space, something in the form of a V, to which has been given the name of *coloboma*.

The operation required to counteract this deformity is most simple. It is only necessary to vivify the edges of the flaps; and, after having carefully brought them together, to keep them so, with the help of sutures, until their reunion is complete. But, should we seek, in every case, to re-establish the cohesion of the eyelids? and may we not, by so doing, interfere with the successful intervention of prothesis?

When the wound is in the upper eyelid, the veil of which is rather extensive, it happens most frequently that the bottom of the conjunctival sinus has not been reached, so that the two edges of the wound are free from adhesions; then surgery intervenes with success, and we have already published a case, from the practice of Professor Roux, of recovery from coloboma, after which an artificial eye had been adapted.

It is not the same when the solution of continuity exists in the lower eyelid. Here, almost always, the wound extends to the

conjunctival sinus, to its greatest depth; and one of the lips of the wound always contracts, in these cases, an adhesion with the globe of the eye. Here the restoration of the eyelid must be prejudicial to the adoption of an artificial eye; so that the best way is not to interfere with the coloboma.

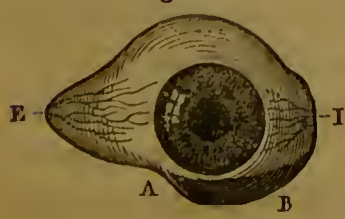
The following is an example of one of the means of prothesis to counteract this deformity.

Wounds affecting both the Lower Eyelid and the Globe; Adhesion of one of the Lips of the Wound to the Ocular Stump; Coloboma; Arrangement of the Shell so as to prevent the necessity for Blepharoplasty.

General X. received, in Africa, a blow of a yataghan, which divided the lower eyelid of his right eye, penetrated the globe, and made a large incision in his cheek. This wound, dressed on the battle field, did not receive the same careful attention which it might have done under other circumstances. The loss of the eye caused the surgeons to allow the wound of the cheek and that of the eyelid to unite spontaneously. Cicatrization took place by the second intention, and left a coloboma in the lower eyelid, and an adhesion between the ocular stump and the external lip of the fissure.

The general, continuing on active service, could not wear a bandage, and procured an artificial eye. Unfortunately the shells first used were badly adapted to the conformation of his orbital cavity; they injured the conjunctival sinus in several places. The depth of the sinus was soon diminished by granulations, principally towards the temporal region; the adhesions also, irritated unceasingly, were greatly thickened. All this induced him to change his oculist. When the general came to M. Boissonneau the solution of continuity which existed in the lower eyelid was in the form of a triangle, the base of which, turned towards the ciliary border, measured about four milimètres in breadth and the conjunctiva, which was of a bright red colour, was exposed. Moreover, the conjunctival sinus had only a depth of three milimètres, and the eyelid adhered to the globe, as we have said, by a very thick band.

Fig. 15.



As Fig. 15 represents it, the new shell adapted by M. Boissonneau shows, on its lower edge, a slope, A, so as not to press the adhesion, or interfere with the movements of the piece. Then, at the side of this slope, and also on the lower border of the sclerotic,

which allowed the opening produced by the coloboma to be seen, this artist gave the enamel a flesh tint, to match the skin of the eyelid, in order to hide the bad effect produced by the white colour of the artificial eyes formerly used by the general.

This tint, A B, given to the lower edge of the shell, did not replace the loss of substance in the eyelid, but it rendered the deformity less apparent, as, at the distance of a few steps, the loss of the palpebral veil was not perceptible.

It will be remarked, perhaps, that the external part of the piece, E, is very narrow. This form was necessitated by the want of depth in the lower and upper conjunctival sinuses, resulting from the presence of the granulations of which we have spoken above.

OF PROTHESIS IN CASES OF LOSS OF SUBSTANCE OF ONE OF THE EYELIDS.

Cases in which wounds or disease destroy a portion of one of the eyelids, and, at the same time, the globe of the eye present such great difficulties that we know of no attempt at restoration by prothesis.

In spite of the great progress accomplished by restorative surgery, we can no longer think of attempting a useful blepharoplasty. At present (whatever may be said to the contrary) we may repeat, with Celsus:—"Si palpebra tota deest, nulla id curatio restituere potest." When the skin of the eyelid only is wanting, it can be replaced by the neighbouring skin; but the eyelid is not composed of skin alone—it has a cartilage, eyelashes, and muscles, so that when the entire thickness of the membranous veil is wanting there is no organic restoration possible. Besides, the new tegument could not present the most striking character of the organ—its mobility. It is even doubtful if, after the attempted restoration, an artificial eye could be adapted. In short, for so small a result, no surgeon would think of attempting blepharoplasty.

This reminds us to notice a very ingenious attempt at prothetic restoration, in the case of a young officer in the Crimean army:—

Destruction of the Globe of the Eye and of the Two Outer Thirds of the Superior Eyelid, by a Gunshot Wound; Application of an Artificial Eye in Enamel, supporting an Eyelid in Wax.

M. B., sub-lieutenant in an infantry regiment at the time of the assault on the Malakoff Tower (Crimea), was struck by a projectile, which wounded the right eye, and carried away two-thirds of the

upper eyelid. Intense ophthalmia, followed by sloughing of the cornea, was the consequence of this wound. When this young officer returned to France he consulted a clever surgeon, M. Guépin, of Nantes, who, judging autoplasty impossible, sent him to M. Boissonneau, junior, to have his deformity remedied by the aid of a prothetic piece. The parts presented the following appearance:—The atrophied globe of the eye retained about five-sixths of its normal size; its form was regularly rounded; the cicatrix of the cornea very small. These lesions were complicated by a loss of the substance of the upper eyelid, about two-thirds of the outer part being gone. About three milimètres remained intact at the external commissure; the remaining portion, at the inner angle, was something less than one centimètre. The mutilation measured about 20 milimètres in length. Fig. 16 represents the form of this lesion, and the dimensions of the substance lost.

Fig. 16.

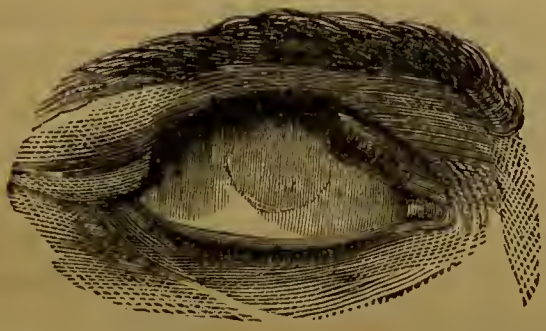


Fig. 17.

One can easily imagine the unpleasant appearance of the eye—a large white globe moving in its orbit, greatly exposed by the loss of substance in the upper eyelid, as well as the large red cicatrix which it presented. M. B. wore a bandage, not only to hide this deformity, but also to protect the globe of the eye from the action of the air and to protect it from dust. The use of this bandage detracted greatly from the appearance of a young officer of 22 years of age. Moreover, M. B. was anxious to pursue a career so brilliantly begun, as already he was decorated with the military medal, the cross of the Legion of Honour, and that of Mitidjé. So many motives were scarcely wanting to incite the zeal of M. Boissonneau, junior, who occupied himself, at first, with the prothesis of the eye, on the success of which depended greatly what could be attempted for the artificial restoration of the eyelid.

The tolerance of the stump of the eye was not doubtful; the lower eyelid offered a sufficient support for the enamel shell; it remained to utilize the flaps of the upper eyelid to maintain the

piece securely in its position, which was the more necessary as the extreme mobility of the ocular stump allowed of the artificial eye having a great range of motion; and, fortunately, the internal flap was extensive enough to support the corresponding part of the artificial eye, while the preservation of the external commissure sufficed to retain its opposite extremity. The general aspect of the eye, its size, the colour of its various parts, and even the direction of its axis, were all obtained without much difficulty; but the deformity was far from having disappeared. The large notch in the upper eyelid allowed a great extent of the upper part of the shell to be seen, so that the white of the enamel, representing the sclerotic, and the bright red of the palpebral cicatrix, made it most desirable that they should be concealed, by adapting to the upper part of the shell a portion of artificial eyelid, which might replace the lost substance of this veil.

Many methods presented themselves. The one most likely to attract M. Boissonneau was that of modelling the eyelid in enamel. He had all the materials at hand; and it is always an advantage when the same artist can execute the different parts of a piece; but all the attempts which he had seen made by his father proved to him the insufficiency of this material for the restoration of cutaneous tissue, for the appearance of enamel is always brilliant, whilst the skin is dull; and in this way the imitation is, therefore, clumsy. Then, the impossibility of placing lashes in the eyelid adds to its imperfection; and, in using it, it is open to the objection of making the pieces too heavy and too fragile; and, as a last consideration, but by no means the least important, the difficulty in executing the pieces makes their price very high. Our oculist decided on making an enamel piece, merely to serve as a model, and then began to study the different materials proposed for the construction of artificial eyelids—principally wax and gutta percha. This last has the advantage of being very durable and easily coloured; but it is more difficult to model than wax, and, besides, it is not so good an imitation of the skin. Wax, on account of its semi-transparency, was, therefore, the material to be chosen in this case.

The choice made, M. Boissonneau brought the piece, complete, which he had constructed in enamel, to M. Talrich, wax modeller to the Faculty of Medicine, and got him to attach to an artificial eye, arranged for the purpose, a portion of eyelid of the size of the piece lost, and corresponding with the two remaining flaps, P, Fig. 17. Thus restored, this eyelid had not only the

same form, the same aspect, the same colour as the healthy eyelid, but also the lashes, suitably arranged, formed, with those which remained, an irreproachable line. All the upper portion of the wax eyelid fitted so well into the folds of the natural eyelid that the joining of the artificial piece with the healthy parts was scarcely perceptible at the extremities. Finally, M. Boissonneau had given to the edge of the piece destined to receive the wax an appropriate form, so arranged that only the polished surface of the enamel should come in contact with the mucus. By this arrangement the use of the piece caused no inconvenience, and its lightness made it as easily borne as an ordinary artificial eye. These details, which we have not feared to enter into, prove that, in this case, the work of prothesis left nothing to desire. Great was the surprise of all who knew M. B., and especially of the surgeons who had been consulted, when they witnessed the happy results arrived at by M. Boissonneau.

Before quitting Paris, this young officer not only took with him several artificial eyes, which were all provided with their wax eyelid, but he took some lessons from M. Talrich, which enables him to model his own artificial eyelid. Each week he devotes about a quarter of an hour to the repairing of these pieces; and, thanks to the aid of prothesis, he has been enabled to remain on active service.

ON PROTHESIS FOLLOWING EXTIRPATION OF THE EYELID, AND OF THE GLOBE OF THE EYE.

Does the progress of industrial arts at present allow of our oculists practising restorations which were interdicted to their predecessors? This is a question which we are induced to ask ourselves, on seeing them undertake to remedy the deformity produced by the extirpation of the eyelids, and the globe of the eye.

In the sketch which we have given of the history of artificial eyes, we have recalled all that has been done from the remotest antiquity until now, in the construction of *ecblepharos*. In spite of the results furnished by prothesis, scarcely 30 years ago we did not hesitate to pronounce that art had limits which the most ingenious proceedings could not overcome. But those who have been mutilated will not accept these decrees of science, and urge artists to renew their attempts, in the hope that they can even triumph over impossibilities. It is of an attempt of this kind that it remains for us to give the results; but in this case the incitement came from the surgeon.

Cancroid of the Eyelid Destroying the Globe of the Eye; Extirpation of the Affected Parts; Application of an Ecblepharos.

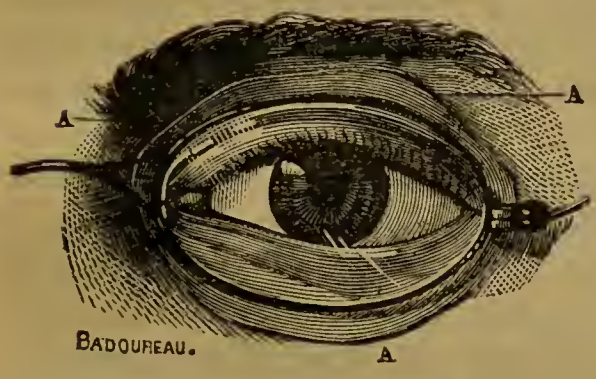
In July, 1856, a women, about 30 years of age, was admitted to the *Hospital de la Pitié*, to be treated for an ulceration which had destroyed the eyelids and the globe of the left eye. But one resource remained to overcome this misfortune, that of removing all the parts attacked by the cancroid affection. M. Maisonneuve proposed this operation to the patient; but she rejected it on account of the deformity which would result from it, and which would prevent her from continuing the exercise of her profession. M. Maisonneuve only succeeded in overcoming her resistance by promising to have a prothetic piece constructed for her which would conceal the deformity. The operation was performed; and when the cicatrization of the parts was complete, the surgeon sent for M. Boissonneau, junior, and begged him to undertake the realization of the promise which he had made to the patient.

The globe of the eye and all the surrounding tissues, as well as the two eyelids—in a space limited by the bony edge of the orbital cavity—had been removed, so that this cavity was gaping, and gave the physiognomy of this woman a most repelling aspect. In this case prothesis of the globe would not suffice; it was necessary to replace the eyelids, maintain the piece in a suitable situation, and in so solid a manner that the patient could continue her work without fear of its falling, and without experiencing any inconvenience from it. M. Boissonneau proposed to M. Maisonneuve to replace all the palpebral region, by the aid of a light metal plate (aluminum or silver), which would be hammered out, *repoussé*, to its proper form, and which would be covered by a coat of flesh-coloured paint; an artificial eye, of suitable form, would be fixed between the two metallic eyelids. Two means existed of fixing the piece in its place —either to fasten it to a pair of spectacles, or to adapt a spring to it, which would embrace the back of the head. This apparatus appearing to contain the elements of success, M. Maisonneuve engaged M. Boissonneau to execute it. Having taken a cast of the region, M. Boissonneau consulted with M. Charrière, who undertook to construct the metallic part of the piece, whilst he occupied himself with the ocular enamel shell. The exterior contour of the metallic plate should follow all the sinuosities of the orbital region, cover it up entirely, and find its support on the healthy parts. This piece finished and tried, M. Boissonneau adapted to the palpebral

opening—arranged in the piece—an enamel eye, of the same colour and convexity as the healthy one. This artificial shell was fastened behind the eyelids by a flange, *sertissure*—that is to say, in the same manner as jewellers fasten the stones in the collet of a ring. A painter was then employed to give to the metallic eyelids a colouring, the shade of which would harmonize with the surrounding parts.[a]

It now remained to fix this piece securely on the part it was destined to conceal. M. Charrière was of the opinion first given by M. Boissonneau, that it would be best to support it by spectacles, the rim of which would serve better to conceal the contour of the plates. Fig. 18 represents this model; but the patient, through an exaggerated feeling of coquetry, rejected the use of spectacles, and requested the employment of a steel spring, which was fastened to the external edge of the metallic plate, and also at the back of the head. The apparatus fixed, the patient arranged her hair in bands, so as to cover the spring, which was thus completely hidden. Patient and assistants were in the greatest admiration of the result obtained by M. Boissonneau; but we, who are more familiar with the marvels of prothesis, are more difficult to satisfy. What, besides, has happened in this case? Five years have passed, and neither M. Maisonneuve nor M. Boissonneau have again seen the patient. Is it not to be supposed that she has renounced the use of the piece and reverted to that of the classical bandage?

Fig. 18.



Clever artists, to whom ocular prothesis is confided, should never forget that the most striking characteristic of the organ which it is their care to restore is its mobility; and that when they cannot impart this character to their artificial pieces, they should abstain from making them; for they only transform the existing deformity into another, which, though perhaps less shocking, attracts quite as much attention. The patients are not always—and especially at first—conscious of it; for instance, in a case of ecblepharos, when the piece is well made—as in that of which we have just shown the

[a] A cast of wax adds to the illusion; but as it lasts a much shorter time, its use would only suit for the wealthy.

plate—the patients, in looking at themselves in a glass, have reason to be satisfied with the restoration which they have undergone. Both eyes being parallel, and the degree of opening between the eyelids identical, the deformity disappears completely during the act; but, for the spectators, it is different. That eye, always fixed and motionless, has the most painful aspect; and we are not astonished that the construction of these pieces is a rare fact in ocular prothesis. If we had the direction of a similar attempt, we should prefer having the eyelid half closed; for the appearance of paralysis of the upper eyelid would be less unpleasant—less shocking, in our eyes, at least, than that motionless, widely-opened eye.

We shall sum up these remarks by saying, that the great progress accomplished by ocular prothesis, within the last 25 years, consists less in the employment of new materials for the construction of artificial eyes—as some oculists would have us believe—than in a more attentive study by these artists of the modifications undergone by the oculo-palpebral cavity after the destruction of the globe of the eye.

This study has enabled them more perfectly to adapt artificial eyes, so that, thanks to the notching of the edge of these pieces to adapt them to the surface of adhesions and cicatricial bands, they have succeeded in preserving a great portion of the movements which the ocular stump imparts to them.

To this disposition of modern pieces may be added the not less ingenious one, which consists in one of the edges of the enamel shell being prolonged, so that it can find a support behind the cicatricial folds, at the same time as on the margin of the orbital cavity, as we have shown examples of.

But of all these improvements, the most remarkable and the least remarked (for one must have experienced difficulties in order to appreciate them) is the adaptation of artificial eyes to very large ocular stumps, or where the cornea has not been destroyed. Here the shells must present a peculiar conformation. The depth of the piece is limited, for its prominence between the eyelids must not be greater than in the healthy eye; therefore it is necessary to have recourse to another artifice to prevent all contact between the cornea and the back of the enamel shell. The following is the manner in which some oculists (and they are not numerous) have surmounted this difficulty:—

In ordinary prothetic pieces, as in the human eye, the layer of

enamel which represents the iris is situated, vertically, three or four milimètres behind the most projecting point of the curve formed by the transparent cornea, so that the antero-posterior diameter of the artificial shell is diminished to the extent of the anterior chamber of the eye. The degree of atrophy which the globe of the eye undergoes in most cases where its function is abolished by a wound, allows the conformation of the normal eye to be followed in the enamel shell; but when the globe of the eye remains voluminous, or there exists a staphyloma of the iris or cornea, this mode of construction is no longer possible. The oculist ought to arrange so that the layer of enamel which represents the iris, in place of being vertical, should be curved, as in cases where, in the normal eye, this membranous disk is pushed forward by the increased volume of the crystalline. In this manner the depth of the enamel shell is increased to the extent of the projection of the interior chamber; and, if the artist has taken care, at the same time, to give to his piece all the amplitude possible, without its resulting in giving it the appearance, when placed under the eyelids, of an exophthalmia, he succeeds in concealing a deformity which, scarcely 20 years ago, was considered irremediable. The case of the lady who remained for eight years confined to her room is an example of this.

In our demonstrations we have preferred facts to assertions; for, as an ancient philosopher has remarked, a fact is a reason plus a proof—*un fait est un raisonnement plus une preuve.*

Art. VI.—*Observations on the Endemic Diseases of British Honduras.* A Thesis, read for the degree of Doctor of Medicine in the University of Dublin, February 16th, 1863. By J. B. Hamilton, A.B., M.D., M.R.C.S.E., Staff Assistant-Surgeon.

I purpose referring, briefly, to those diseases which may be properly called endemic, and, to a certain extent, peculiar to British Honduras; and, for this purpose, shall divide them, as usual, into Medical and Surgical—the former being, for the most part, the result of miasmata, and the latter, of the reptile and insect pests which render the habitation of Europeans in this climate so dangerous and unpleasant.

Of the former, the most important, by far, are those commonly called miasmatic, or, as their name implies, those induced by the

action of a certain subtle poisonous miasm or malaria; and, as a clear and simple proof of this, I may state that, during the year 1861, out of 283 admissions into the Military Hospital, no less than 139 were for fever of a remittent or intermittent type; and that of the deaths, which were only six in number, four were the result of fever, while one was accidental, and the other from delirium tremens.

A curious fact, and one not easy to explain, in connexion with this malarious influence is, that yellow fever is extremely rare; though hardly a year passes without an epidemic on the same coast, either to the north or south, and frequently both, within a few hundred miles. Remarking on the last epidemic of yellow fever, which took place in 1860, the principal medical officer in charge (Mr. Thornton) states:—"It was exceptional, being the only epidemic that had visited Belize (the chief town) for upwards of 13 years; but this year's epidemic appears to have extended over the whole of Central America, as various cities, north and south of the Honduras settlement, had suffered by one of those waves of the kind which pass over these countries, and it here found a sufficient *nidus*, as it were, in the extensive lagoons and rank vegetation to harbour itself, and spread devastation among the white population, far and near."

I shall now endeavour to explain the causes of these miasmatic diseases, as far, at least, as they are ascertained and understood.

In the first place, it may be laid down as a rule that these malarious fevers are always, to a certain extent, epidemic as well as endemic—that is, they rage at certain periods with tenfold intensity, though, owing to the swampy condition of the country at all times, they are never wholly absent. This period, which is well known there as the "fever season," is generally about the months of August, September, and October; and, to make the reason of this clear, it will be necessary to explain the different phenomena observed at different periods of the year.

The whole line of coast, for many miles inland, consists of alluvial soil and decomposed rank vegetation, and this is especially the case in and about the city of Belize, situated, as it is, on the "Delta" of the Belize River, which is entirely composed of alluvial deposits. As soon, therefore, as the rainy season comes on, which is generally about the month of April, the entire surface of the land becomes flooded, and continues in this state till the beginning of August, when the short, or, as the Creoles call it, the "maugre dry," sets in, with intense heat from the sun, the rays of which, falling perpen-

"In preparing this new edition I have not confined myself to an enquiry into the efficiency of one particular remedy, but have taken the opportunity to consider, at some length, the pathology and general treatment of the diseases in question."

The cases which have been adduced to illustrate the different modes of treatment are admirably described, and are, we can assuredly say, truthful pictures, drawn from bed-side practice—the most valuable of all. The very practical way in which each subject has been handled proves at once to the hospital surgeon how diligently the author has been engaged in the study of those diseases treated, the best guarantee to the public for security. We have no hesitation in recommending this volume to the student, and to the surgeon likewise; profitable information rests on every page in it.

On Long, Short, and Weak Sight, and their Treatment, by the scientific use of Spectacles. By J. SOELBERG WELLS, M.R.C.S., Eng.; M.D., Edin.

THIS is a subject which ought to interest every one. There are very few who have not either some defect in vision themselves, or some friend who has. How often do we hear a gentleman who has begun to leave off reading the small print in his newspaper, and holds it at arms' length from his eyes, say—"I think I must get a pair of spectacles, but I am afraid of making my sight worse." After much consideration he, at last, turns into an optician's, and gets a pair of "nose nippers," which he lets hang gracefully in front of his waistcoat. The glasses are called "clearers." He tells his friends that he has got the very weakest, as he only wants them for reading small print. After a short time he finds he still has to hold his paper at a distance, and slant it so as to get a strong light on it. He again visits the optician, who supplies him with a higher number. For the first two or three days he feels an unpleasant weight about his eyes; he takes off his glasses frequently to rub his forehead, in which he feels an uneasiness and sometimes even pain. However this goes off, and he is very well pleased with the improvement in reading. Some fine day he goes out in a hurry and forgets his glasses. In the course of the day he goes to his club and takes up the papers; he passes over the small print as he has left his glasses at home, and turns to the

large; but to his surprise he finds that he cannot read it as well as he used to read the small print before he began to use his specs. He concludes that he has begun the use of spectacles too soon, and has thus injured his sight. The fact being, that in the first, he got too weak a glass, in the second, much too strong. In Germany the choice of glasses is not left to the optician. The medical attendant ascertains whether the eye be healthy or otherwise. Examines the amount of the defect in vision, and then prescribes the proper glass to remedy the defect. We have given the above example of the evils of a hap-hazard choice of glasses in long sight, or old sight, as the most familiar; but the evils of such a choice, in eyes affected with short or near sight, are much greater. Many such eyes have been destroyed by the injudicious selection of glasses.

Mr. Wells' book, which we have read with much pleasure, would have supplied the practitioners with an excellent guide, had the author been a little more careful in transcribing the figures in the formulæ. Out of five of these three are incorrect. The views of Graefe, Donders, &c., are very clearly given and compared with each other. The object of the book is best described in the author's own words, in his preface, and we must commend the author for his prudence in avoiding complicated calculations:—

"I have endeavoured, in these pages, to lay before the reader, in an easy and practical form, the modern theories of the affections, of the accommodation and refraction of the eye, so as to enable him at once to grasp the most salient and important points in the symptoms, diagnosis, and treatment of these diseases. I have purposely abstained from mathematical calculations, and have confined myself to such simple formulæ as I have found most serviceable and ready in practice."

The book is divided into eight chapters. The first contains an account of some of the various theories on the accommodation of the eye. The second commences with a definition of the term range of accommodation; followed by a description of some of the methods employed for ascertaining the measurement or extent of this range, and concludes with a division of eyes, according to these measurements, into normal, myopic, and hypermetropic. The six other chapters are devoted to the consideration of these conditions of the eye, their causes, and treatment by the use of glasses.

"By the term Accommodation, is meant the power which every normal eye possesses of adjusting itself almost imperceptibly and

unconsciously to different distances." It has long been a keenly-debated question in what the changes of accommodation of the eye consists. Some of the various opinions the author gives, and compares them in a very lucid manner with the opinion of Graefe, which is now generally held to be the correct one—namely, that the ciliary muscle is the active agent. Cramer, Donders, Helmholz, Müller, and others, considered that the iris plays a more or less important part in the mechanism of accommodation. The question was set at rest by a case which occurred in Professor Von Graefe's Clinique, in 1859. The case is shortly this:—Whilst Professor von Graefe was abscising a prolapse of the iris, the patient made a sudden violent movement with his head which the assistant could not check; the iris was somewhat dragged, and a dialysis occurred at the opposite side. The portion of iris still lying between the lips of the wound was drawn gradually out until the dialysis was complete. The whole iris was thus removed. The slight effusion of blood soon disappeared from the anterior chamber. Ten days after the operation, the cornea had also regained its transparency. The state of vision in this eye was as perfect as the other normal eye. He could count fingers at 150 feet, and read No. 1 of Jägers, *i.e.*, the smallest print, at eight inches. The power of accommodation was most accurately and severely tested, and it was found that in spite of the total absence of the iris, his power of accommodation was quite normal.

The range of accommodation is defined thus:—"The distance between the furthest and nearest point of distinct vision, is called the territory, or range of accommodation. When the eye has assumed its highest state of refraction, it is accommodated for its nearest point of distinct vision; when its state of refraction is, on the other hand, relaxed to the utmost, it is adjusted for its furthest point." The first simple formula our author gives us is from Donders:—"The range of accommodation A, is given by the focal distance (*a*) of an ideal lens, which, placed upon the anterior surface of the crystalline lens, would afford, to rays emanating from the near point, a direction as if they came from the far point. We must suppose this lens a meniscus, placed upon the anterior surface of the crystalline, because the accommodation depends almost exclusively upon a change in the convexity of the anterior surface of the lens." Our author then illustrates this by the formula $\frac{1}{p} - \frac{1}{r} = \frac{1}{a}$ and $A = \frac{1}{a}$. He calls r, the far point; p, the

near point; ∞, infinite distance; ′, foot; ″, inch; ‴, line. Having thus settled his figures he goes off full sail:—"Normal eyes, which can see from an infinite distance up to 4″ from the anterior surface of the crystalline lens, have their far point (r) at an infinite distance (∞), their near point at 5″;" we should have said 4.″ In order to find the range of accommodation of such an eye, we apply the formula $A=\frac{1}{p}-\frac{1}{r}$. In our case $r=\infty$, $p=5''$; therefore, $A=\frac{1}{4}-\frac{1}{\infty}=\frac{1}{5}''$. We humbly submit that if our author had used the old sign for infinity $\frac{1}{0}$ he would find it more serviceable and ready in practice. In Graefe's Archiv. the formula stands thus, $A=\frac{1}{4}-\frac{1}{\infty}=\frac{1}{4}$. He then gives Graefe's method for treating the range of accommodation. We shall here only mention that a convex lens is used to ascertain the far and near point. Here the same formula is employed. In the first example, a myopic eye, we find that (with convex 6) $r'=5''$, $p=3''$. The eye is consequently myopic, for it is not adjusted for the normal far point (6″), but for a nearer one, the rays from which impinge in a divergent direction upon the eye, $A=\frac{1}{3}-\frac{1}{5}=7\frac{1}{2}''$.[a] Of course our author having found these formulæ "most serviceable and ready in practice," we must take for granted they are really useful to him; but $7\frac{1}{2}$ seems to us to be a great deal for so little to be equal to. We may say the same of the formula for the hypermetropic eye. "$A=\frac{1}{3}-\frac{1}{8}=4\frac{4}{5}$."[b] Such errors seem very trivial when corrected, but to ordinary readers are a source of great confusion and perplexity.

Chapter III. contains a very interesting description of myopia, or near sight. This chapter and those following it are well worthy of being read. "In myopia the refracting power of the eye is increased, or the optic axis too long, so the parallel rays (emanating from distant objects), or even not sufficiently divergent rays, are brought to a focus before the retina." . . . "In the short-sighted eye, therefore, only such rays as come from a finite distance, and impinge in a sufficiently divergent direction upon the eye, are united upon the retina."

Short sight is often hereditary, often acquired in early life. An

[a] $A=\frac{1}{3}-\frac{1}{5}=\frac{1}{7\frac{1}{2}}$.

[b] $A=\frac{1}{3}-\frac{1}{8}=\frac{1}{4\frac{4}{5}}$.

explanation of the latter is put forward by the author in the case of persons employed at watchmaking, needle-work, &c.:—"Persons thus employed continually accommodate for a very near point, their lens has, therefore, constantly, to assume a more convex form; and after a time it may not be able quite to regain its original form, even when the necessity for adjusting itself for near objects has ceased. This occurs more frequently when the lens naturally possesses but a slight degree of elasticity; for, after it has been for a length of time accommodated for near objects, it gradually loses the power (like a bad watch-spring) of springing back to its original form—it remains too convex even when the pressure upon its periphery ceases." Lengthening of the eyeball is also given as a cause of short sight, the most common cause of which, is the disease known as sclerotico-choroiditis posterior. Graefe considers that in every case in which the myopia is considerable posterior sclerotico-choroiditis is present.

The ophthalmoscopic examination of the myopic eye is very interesting. For the description we must refer the reader to Mr. Wells' book; but we extract the following remarks on the prognosis:—

"It is of great consequence accurately to determine the amount of the myopia, so that we may hereafter be able at once to judge whether it has remained stationary or has progressed. In the most favourable cases the myopia remains stationary at the adult age; later in life it may even decrease somewhat, but generally this is not the case; and the popular idea that myopia decreases in old age is erroneous. This error is due to the fact that it was thought possible to determine the degree of myopia by the position of the near point; and, partly, also by the fact, that short-sighted people can see better at a distance when they get older on account of the increasing diminution in the size of the pupil. There is nothing to be feared from a slight stationary myopia; far different is it, however, if it be progressive, for it is then always a source of danger to the eye."

Donders considers every myopia progressive during youth. He gives many cautions to be observed at this time. Everything that may cause a determination of blood to the eye, working with the head bent forward, &c. A very interesting description of "Myopia in Distans," as described by Graefe, follows, which is too long for us to give in full. The patient could see distinctly as far as six feet, as if his eyes were normal; beyond that distance, namely, at ten

feet, he could not discern even the outlines of a picture. A strong concave glass quite corrected the defect in vision. Several theories have been started to account for this phenomenon. The affection is very rare:—

"The degree of myopia is easily determined according to Donders' method. If, for instance, a myopic person can read No. 1 of Jägar up to a distance of 10 inches, his far point lies at 10 inches, and his myopia $= \frac{1}{10}$; for, with a concave glass of 10-inch focus, he would be able to unite parallel rays upon the retina. For, does not the glass render parallel rays as divergent as if they came from a distance of 10 inches before the eye?

"But although, theoretically, a concave glass of 10-inch focus should be the proper one, we find in practice that it would be too strong. This is due to the convergence of the optic axis; for this prevents the eye from accommodating itself for its far point—the latter is only attainable when we look at distant objects with parallel axis. We should find that our patient would require concave glasses of 12 or 13 inches focus.

"It is still, however, a much debated question whether short-sighted persons should be allowed glasses for reading, writing, &c. Donders strongly recommends it for the following reasons:—

"1. Because strong convergence of the optic axis is necessarily paired with tension of the accommodation. . .

"2. On account of the habit which short-sighted persons have of bending their head forwards during reading or writing. This must cause an increased flow of blood to the eye, and an increased tension within the eye itself. . . .

"The greater the range of accommodation the less harm will spectacles do, and *vice versâ*.

"Whilst these forms of myopia may be furnished with spectacles for near objects, it is very dangerous to permit their use in patients whose range of accommodation is very limited, and who suffer from such an amount of amblyopia that they cannot read No. 4 or 5 of Jäger, even with the most accurately chosen glasses. Such patients will bring the object very close to the eye in order to obtain large retinal images, the accommodation will be greatly strained, the intra ocular tension be increased, and grcat mischief be sure to ensue. If there be much amblyopia, spectacles should not be permittcd at all for near objects."

Chapter IV. is on insufficiency of the recti interni muscles as a cause of defective vision. We could not do justice to this chapter by giving short extracts from it. It must be read as a whole. Double vision and its treatment by prismatic glasses is very well

described, and the advantages of operation put in a clear light. We are glad to see that Mr. Wells is now publishing a series of papers in the *Times and Gazette* on strabismus.

Chapter V. is on sclerotico-choroiditis. This disease, of which little, if anything, was known before the ophthalmoscope came into use, is the cause of many of the unmanageable cases of near sight. The usual position of the inflammation is around the entrance of the optic nerve. It appears like a crescent round the optic disc or blind spot. In this case vision is only impaired, but the same process may go on in the region of the macula lutea.

"Little white patches appear, which increase in size, and coalesce, giving the whole an appearance of alternate white and dark reticulated spaces, the white spots being due to the sclerotic shining through the atrophied stroma and pigment layer of the choroid. . . . . The occurrence of the disease at the macula lutea causes generally great impairment of vision, and the patients then also complain of the constant appearance of one or more central fixed black spots (scotomata)."

The complications of this disease are very serious. Vitreous opacities, pigmentation of the retina, detachment of the retina, opacity at the posterior pole of the lens, occur in the later stages of the disease—"Cataracta accreta and atrophy of the globe may close the scene."

Chapter VI. is on old sight or presbyopia. The formulæ are very clear, and can be used by any one. Our author says:—

"Let us, with Donders, consider presbyopia, to begin when the near point is removed further than eight inches from the eye.

"The degree of presbyopia may, according to Donders, be easily found thus:—If p. $>8''=8+n$, presbyopia Pr.$=\frac{1}{8+n}-\frac{1}{8}$.

"This simply means that we are to deduct the near point ($8''$), at which we consider the presbyopia to commence, from the presbyopic near point. If, for instance, the latter lies at $12''$, it would be $\frac{1}{12}-\frac{1}{8}=-\frac{1}{24}$. Again, if it lies at $16''$, it is $\frac{1}{16}-\frac{1}{8}=-\frac{1}{16}$. Pr. $=\frac{1}{16}$. We have, at the same time, found the number of the convex glass, which would bring the near point back again to 8 inches. In the first case it would be convex 24, in the last convex 16. . . .

"There can be no question as to the advisability and necessity of affording far-sighted persons the use of spectacles. They should be

furnished with them as soon as they are in the slightest degree annoyed or inconvenienced by the presbyopia. Some medical men think that presbyopic patients should do without spectacles as long as possible, for fear the eye should even, at an early period, get so used to them as soon to find them indispensable. This is, however, an error, for if such persons are permitted to work without glasses, we observe that the presbyopia soon rapidly increases."

Chapter VII. is on hypermetropia. The author explains:—"By hypermetropia is meant that peculiar condition of the eye in which the refractive power of the eye is too low, or the optic axis (the antero-posterior axis) too short;" and he considers hypermetropia to be often the cause of asthenopia and convergent strabismus.

"The refractive power of the eye is so low, or its optic axis so short, that when the eye is in a state of rest, parallel rays are not united upon the retina but behind it, and only convergent rays are brought to a focus upon the latter.

"It was, indeed, a great boon when Donders discovered that most of the cases of asthenopia depend upon hypermetropia, and might, therefore, be permanently cured by the proper use of convex glasses.

"In these cases of asthenopia, dependent upon hypermetropia, we sometimes find with the ophthalmoscope that the choroid and retina are somewhat congested. And I have known patients, in whom this was the case, strongly advised to abstain from all work, and particularly to eschew the use of spectacles. . . . The congestion is in fact owing to the overstraining of the accommodative apparatus, and will disappear as soon as the necessity for this over-exertion is removed by the neutralization of the hypermetropia through convex glasses.

"I must therefore strongly urge the necessity of the hypermetropic person wearing glasses *always*, for distant as well as for near objects."

Chapter VIII. treats of paralysis, spasm, and atony of the ciliary muscle, &c. Into the particulars of this chapter we have not space to enter. We perfectly agree with the author in his conclusion:—

"That the proper and scientific choice of spectacles is of great importance to the public, and I have no hesitation in saying that the empirical hap-hazard plan of selection, generally employed by opticians, is but too frequently attended by the worst consequences; that eyes are often ruined which might, by scientific and skilful treatment, have been preserved for years. I would, therefore, recommend strongly the adoption of the following plan, which is largely employed on the continent, and also by several ophthalmologists in England. The medical man himself selects the proper glass; the focal distance of the required glass is written on a slip

of paper, which is taken to the optician, who supplies the patient with the spectacles prescribed thereon."

We can strongly recommend a careful study of the whole book to our readers. The errors in the arithmetic any one with a knowledge of vulgar fractions can correct.

On Ovarian Dropsy: its Nature, Diagnosis, and Treatment. By I. BAKER BROWN, F.R.C.S., &c., &c. J. W. Davies, London. 8vo., pp. 283.

THE subject of ovariotomy is, perhaps, the most important at present under discussion in the chirurgical world. It is scarcely ten years since the operation was even admitted as one which might possibly become legitimate; and to the present day few of those surgeons who had acquired a certain status at that period, have given in their adhesion to this new and formidable operation. We therefore receive with pleasure any addition to the already not scanty literature on the subject of disease of the ovaries, being firmly convinced that by degrees, as fresh light will be brought to bear upon the subject, and new facts elicited, the correct diagnosis of their diseases will be facilitated; and that once obtained, we may fairly expect a greater degree of success in future operations.

It has been said that the agriculturist who causes two blades of grass to grow where only one blade grew before is a great public benefactor. What shall be said of those men who, in the teeth of a storm of opposition—unsuccessful operations, and the resistance of the *vis inertiæ* of preconceived opinion and prejudice—have still persisted in their course, and have at last succeeded in establishing ovariotomy among the legitimate operations of surgery, and that not only in Great Britain, but also on the Continent? But a few years ago the wretched victim of ovarian dropsy, however young, however free from all malignant disease, was doomed to a slow, exhausting, and lingering death; her life was wretched, and the only relief she experienced was when the surgeon came, from time to time, to tap the ever-filling cyst. At last such a patient would die, not killed by a disease, the existence of which was incompatible with life, but simply worn out—exhausted. Ovariotomy could, in all probability, have saved such a one; for, the published tables of

this operation show the great fact, that out of 395 completed operations, 212 have resulted in recovery. Great honour, then, is due to British surgery; for this operation is essentially of British origin, and will ever reflect the greatest credit on British genius, philanthropy, and perseverance.

The work before us is divided into six chapters, which treat successively of the pathology of ovarian or encysted dropsy; of the symptoms and cause of ovarian dropsy; of the diagnosis of ovarian dropsy; of the treatment of ovarian dropsy; concluding with a narrative of 42 cases of ovariotomy, with the patient's previous history and the eventual result, embodying a mass of information, the value of which could not be over-estimated.

The author reviews the various modes of treatment, commencing with the several forms of tapping through the abdominal walls, the vagina, and the rectum; tapping, followed by regulated pressure, and treatment by injections of iodine after tapping. Graduated pressure after tapping seems to have proved successful on several occasions in Mr. B. Brown's practice; and at p. 100 will be found the details of a very interesting case treated and cured by this method alone. But we should fear that in the event of this treatment failing, the patient would be then in a less favourable position for the operation of ovariotomy, as we would fear that the long-continued pressure might have been productive of many adhesions, which always more or less serve to complicate and render more hazardous the operation.

The chapter devoted to the consideration of the operation itself is full of instruction. Speaking of the character of the incision, the author says:—"I have not enjoined the use of any particular length of incision. . . . . The long, the medium, and the short and small incision have each had their advocates. . . . And statistics have been adduced to show that fewer deaths attend this or that length of incision. Such discussions I regard as of little moment." So far as our personal experience goes we fully concur with the author; and we believe that the length of the incision will not tell against the patient's chances of recovery, while it will greatly facilitate the proceedings of the operation, and thus indirectly increase the chances of success. We have been taught by practical experience that the peritoneum is not that delicate membrane which it was once thought to be; it is of far tougher constitution, and will bear a deal of hard usage, as is well proved by those cases in which the operation has not been concluded in consequence of